

REMARKS

In this response, Applicant amends claims 18, 20, 21, 23, 25, 28, and 52 as shown above. Support for the amendments can be found throughout the specification. For example, support for amending the base to PAG molar ratio in claims 18, 20, and 25 to recite a range of about 0.2 to about 1 can be found at the first paragraph of page 3, and support for amendments to claims 23, 28 and 52 can be found, for example, on pages 3 and 5 and/or the examples presented in the specification, as well as in other portions of the specification. Thus, no new matter is added. As discussed in more detail below, the application is condition for allowance.

Allowed Claims

Applicant acknowledges with appreciation allowance of claims 19, 50, 51 and 53-55.

Rejections Under 35 U.S.C. 103

The Office Action rejects claims 18, 20-24, 52 and 56-58 as being unpatentable over U.S. Patent No. 6,306,554 of Barclay.

Claim 18, as amended, recites a photoresist having a micron or submicron linewidth variation when exposed to radiation having a wavelength of about 248 nm or less that includes a polycyclic copolymer, a photoacid generator and a base having a molar concentration ratio in a range of *about 0.2 to about 1* relative to the photoacid generator.

As noted in response to the previous Office Action, Barclay is understood to describe photoresist compositions that include, in addition to polymer resins having heterocyclic rings, a photoacid generator and a base additive. Barclay does not teach a base to PAG molar ratio in a range of about 0.2 to about 1, as recited in claim 18. Applicant respectfully maintains that the Examiner employs Applicant's own teachings to extract a broad range of 0.1 to 20 for the base to PAG molar ratio from the Barclay reference. Notwithstanding, Applicant's affidavit filed with the previous response (a copy of which is enclosed with this response) presents evidence that the range of 0.2 to 1.5 for the base to PAG molar ratio unexpectedly reduces line edge roughness.

The Examiner asserts that these experimental results do not address the base to PAG molar ratios beyond the upper end of this range. Applicant disagrees. In fact, the experimental results presented in Table 2 and Table 5, together with the explanation provided in Paragraph 11, of the affidavit indicate that tested photoresist compositions with base to PAG molar ratios of 2, 5, 10, 15 and 20 (i.e., ratios beyond the upper end of this range) *fail* to image. That is, they are not suitable for use as positive photoresists, much less as photoresists exhibiting reduced line edge roughness.

In addition, the Examiner objects that the experimental results go only up to a ratio of 0.8, and not to the upper endpoint of the originally claimed range (1.5). In order to expedite the prosecution of the application, claim 18 is amended to recite a range of about 0.2 to about 1.0 – an upper endpoint that is only 0.2 higher than 0.8. Applicant is not obligated to provide data at every point of the claimed range – in fact this would be impossible to fulfill as the number of points in the claimed range is infinite. Rather, Applicant has provided a reasonable number of data points within the claimed range to show reduced line edge roughness in that range, as well as a reasonable number of points outside the claimed range where the inventive feature is not present.

Thus, claim 18 is in condition for allowance. Claims 52, 56, and 57 depend on claim 18, and hence are also patentable. Similarly, independent claim 20 distinguishes patentably over Barclay as it recites a base to PAG molar ratio of about 0.2 to about 1. Claims 21-24, and 58 depend on claim 20, and hence are also patentable.

In Paragraph 3, the Office Action rejects claims 18, 20, 21, 23, 24, 52 and 56-58 as being unpatentable over Barclay in view of U.S. Patent No. 5,879,856 of Thackeray.

As noted above, Barclay fails to recognize that the use of a base to PAG molar ratio in a range of 0.2 to 1 in a photoresist composition can result in reduced line edge roughness. Moreover, Thackeray fails to bridge the shortcomings of Barclay. In particular, even if one agrees with the Examiner that Thackeray teaches a photospeed to PAG molar ratio in a range of 0.0212 to 0.42, Thackeray does not recognize that a small subset of this range, namely, 0.2 to 0.4, can result in much reduced line edge roughness. Neither does Thackeray teach photospeed to

PAG molar ratios beyond 0.4. In contrast, claim 18 recites a base to PAG molar ratio in a range of about 0.2 to about 1, which provides reduced line edge roughness, as discussed in detail above.

Hence, claim 18, and claims 52, 56 and 57 that depend on claim 18, distinguish patentably over the combined teachings of Barclay and Thackeray.

Similar arguments apply with equal force to establish that independent claim 20 also distinguishes patentably over the combined teachings of Barclay and Thackeray as this claim likewise recites a base to PAG molar concentration ratio in a range of about 0.2 to about 1. Further, claims 21, 23, 24 and 58 depend on claim 20, and hence are also patentable.

In Paragraph 4, the Office Action rejects claims 25-28 and 59 as being obvious over Barclay in view of the Published International Application No. WO 00/67072 of Feiring.

Independent claim 25, as amended, recites a photoresist having micron or submicron linewidth variation when exposed to a wavelength of about 248 nm or less, which includes a polymer or copolymer containing fluorinated alcohol substituted polycyclic ethylinically unsaturated monomeric unit, a photoacid generator and a base having a molar concentration ratio in a range of *about 0.2 to about 1* relative to the photoacid generator.

As discussed in detail above, Barclay fails to teach that utilizing a base to PAG molar ratio in a range of about 0.2 to about 1 would result in much reduced line edge roughness. Further, Feiring, which relates to fluorine containing polymer compositions having UV transparency, does not teach this range of base to PAG molar ratios.

Accordingly, claim 25, and claims 26-28 and 59 that depend on it, are patentable.

In Paragraph 5, the Office Action rejects claims 25, 26, 28 and 59 as being obvious in view of the combined teachings of Barclay, Thackeray and Feiring.

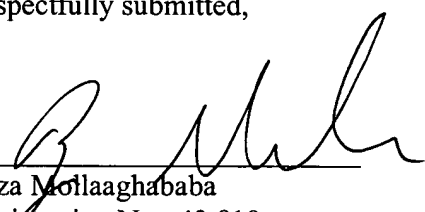
As discussed in detail above, the combined teachings of Barclay and Thackeray fail to teach or suggest the range of base to PAG molar ratio recited in claim 25 (i.e., a range of about 0.2 to about 1). Further, Feiring does not bridge the shortcomings of Barclay and Thackeray as it does not teach a base to PAG molar ratios in this range. Accordingly, amended claim 25, and claims 26, 28 and 59 that depend on claim 25, are patentable over the combined teachings of these references.

CONCLUSION

In view of the above amendments and remarks, Applicant respectfully requests reconsideration and allowance of the application. If there are any remaining issues, the Examiner is invited to call the undersigned at (617-439-2514) to expedite the prosecution of this application.

Respectfully submitted,

Dated: May 14, 2004

By 
Reza Mollaaghababa
Registration No.: 43,810
NUTTER MCCLENNEN & FISH LLP
World Trade Center West
155 Seaport Boulevard
Boston, Massachusetts 02210-2604
(617) 439-2000
(617) 310-9000 (Fax)
Attorney for Applicant